

**NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD**

**PIPELINE**

(Ft.)

**CODE 516**

**DEFINITION**

Pipeline having an inside diameter of 8 inches or less.

**PURPOSE**

To convey water from a source of supply to points of use for livestock, wildlife, or recreation.

**CONDITIONS WHERE PRACTICE APPLIES**

Where it is desirable or necessary to convey water in a closed conduit from one point to another.

**CRITERIA**

**Capacity.** The pipeline installation shall be adequate to supply the daily water requirements of the planned use. Daily water requirements for livestock and/or wildlife are available in the NRCS National Range and Pasture Handbook (NPRH) or Iowa State University Extension Publication "Watering Systems for Grazing Livestock" (Pm-1604).

For recreation areas the water capacity shall be adequate for all planned uses. Typical examples are drinking water, fire protection, showers, flush toilets, and irrigation of landscaped areas.

**Sanitary Protection.** If water from the pipeline is to be used for human consumption, the requirements of the Iowa Department of Health and local regulations for materials and installation must be met.

**Pipe.** All pipe must withstand the pressure it will be subjected to including hydraulic transients, internal pressures, and external pressures. As a safety factor against surge or water hammer the working pressure should not exceed 72 percent of the pressure rating of the pipe and the design flow velocity at system capacity should not exceed 5 ft/sec. The designer may exceed either of these limits if a site specific hydraulic analysis is completed and documented demonstrating the pipeline and associated appurtenances will not exceed the manufacturers published water pressure rating during operation.

Steel pipe shall meet the requirements of AWWA Specification C-200.

Plastic pipe shall conform to the requirements of the following ASTM specifications, as applicable:

- D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
- D 1785 Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D 2104 Polyethylene (PE) Plastic Pipe, Schedule 40
- D 2239 Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
- D 2241 Poly(Vinyl Chloride) (PVC), Pressure-Rated Pipe (SDR)
- D 2282 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
- D 2447 Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter

D 2513 Thermoplastic Gas Pressure Pipe, Tubing and Fittings

D 2737 Polyethylene (PE) Plastic Tubing

D 2672 Joints for IPS PVC Using Solvent Cement

D 3035 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter

AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches

AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inches

Plastic pressure pipe fittings shall conform to the following ASTM specifications, as applicable:

D 2464 Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2466 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

D 2467 Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D 2468 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40

D 2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe

D 2683 Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing

D 3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals

D 3261 Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

Solvents for solvent-welded plastic pipe joints shall conform to the following ASTM specifications, as applicable:

D 2235 Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings

D 2564 Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D 2855 Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings

Rubber gaskets for pipe joints shall conform to the requirements of ASTM F477, Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

The minimum nominal pipeline diameter shall be 1-¼ inch for galvanized steel or plastic pipe and ¾ inch for copper or brass pipe.

**Livestock Water Supply from a Pond.** The water supply system shall consist of a continuous (no pipe joints) pipeline through the dam, an intake, and a control valve. The valve shall be located below the frostline and installed so that it may be operated from the surface of the fill or ground.

**Drainage.** Valves or unions shall be installed at low points in the pipeline so that the line can be drained as needed. Check valves shall be installed, as needed, to protect groundwater quality or maintain a full pipeline.

**Vents.** Design shall provide for entry and removal of air along the pipeline, as needed, to prevent air locking or pipe collapse. If parts of the line are above the hydraulic gradient, periodic use of an air pump may be required. Provisions shall be made for pressure relief, air relief, and vacuum relief, as needed, to protect the pipeline.

**Joints.** Watertight joints that have a strength equal to that of the pipe shall be used. Couplings must be of material compatible with that of the pipe. If they are made of material susceptible to corrosion, provisions must be made to protect them.

**Protection.** When steel pipe is used, interior protective coatings shall be provided in accordance with Irrigation Water Conveyance Steel Pipe (430FF). If a coal-tar enamel protective coating is needed for corrosion protection, the coating shall meet the Steel Pipeline requirements of AWWA Specification C-203.

Steel pipe installed above ground shall be galvanized or shall be protected with a suitable protective paint coating, including a primer coat and two or more final coats.

Plastic pipe installed above ground shall be resistant to ultraviolet light throughout the intended life of the pipe. When needed, install thrust control measures to offset the forces created during flow direction changes.

All pipes shall be protected from hazards presented by traffic, farm operations, freezing temperatures, fire, and thermal expansion and contraction. Reasonable measures should be taken to protect the pipe from potential vandalism.

**Vegetation.** Disturbed areas shall be established with vegetation or otherwise stabilized as soon as practical after construction. Seedbed preparation, seeding, fertilizing, and mulching shall conform to Critical Area Planting (342).

**Visual Resources.** The visual design of pipelines and appurtenances in areas of high public visibility shall be carefully considered.

## PLANS AND SPECIFICATIONS

Plans and specifications for installing pipelines shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the pipeline is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

The following list of Construction Specifications is intended as a guide to selecting the appropriate specifications for each specific project. The list includes most, but may not contain all, of the specifications that are needed for a specific project:

- IA-1 Site Preparation
- IA-3 Structure Removal
- IA-6 Seeding and Mulching for Protective Cover
- IA-11 Removal of Water
- IA-21 Excavation
- IA-23 Earth fill
- IA-27 Diversions
- IA-45 Plastic (PVC, PE) Pipe
- IA-52 Steel Pipe Conduits
- IA-92 Fences

## OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan specific to the type of installed pipeline shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- Opening/closing valves to prevent excessive water hammer
- Filling at the specified rate requirements
- Inspecting and testing valves, pressure regulators, pumps, switches, and other appurtenances
- Maintaining erosion protection at outlets
- Checking for debris, minerals, algae, and other materials which may restrict system flow
- Draining and/or providing for cold weather operation of the system

## REFERENCES

USDA-NRCS, National Engineering Handbook (NEH), Part 650, Engineering Field Handbook (EFH), Chapter 3

USDA-NRCS, National Range and Pasture Handbook

Montana Stockwater Pipeline Manual – Iowa Edition

Watering Systems for Grazing Livestock, ISU Extension Publication Pm-1604